

Tanta University	3 <sup>rd</sup> year, Computers & Control Dept.
Faculty of Engineering	Digital Control

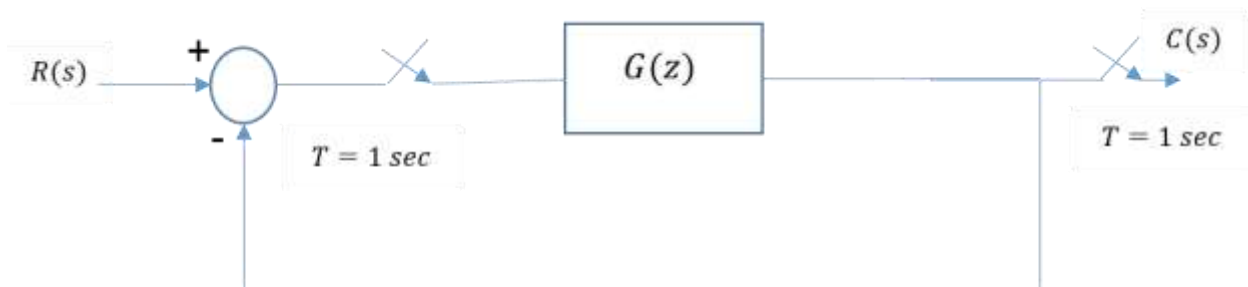
## Sheet 4

1. Check if the roots of the following characteristic equations lie within the unit circle:

- a)  $5z^2 - 2z + 3 = 0$
- b)  $z^3 - 0.2z^2 - 0.25z + 0.05 = 0$
- c)  $z^4 - 1.7z^3 + 1.04z^2 - 0.268z + 0.024 = 0$
- d)  $z^3 + 5z^2 + 3z + 2 = 0$

2. For the system shown in figure below with discrete gain

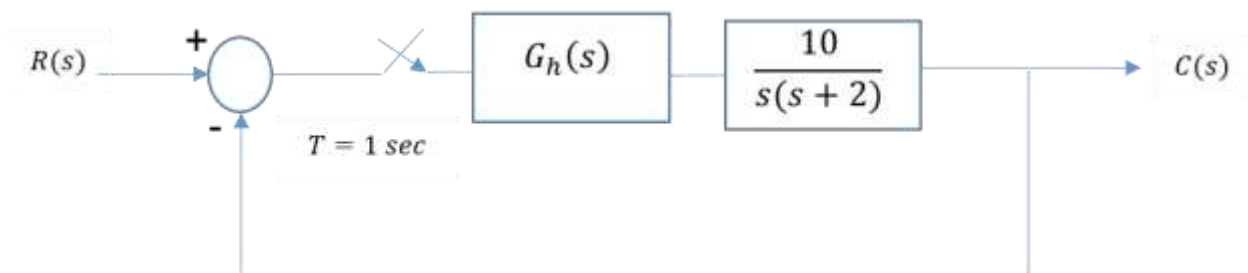
$$G(z) = \frac{0.1(z + 0.9)}{(z - 1)(z - 0.7)}$$



Check the system stability using:

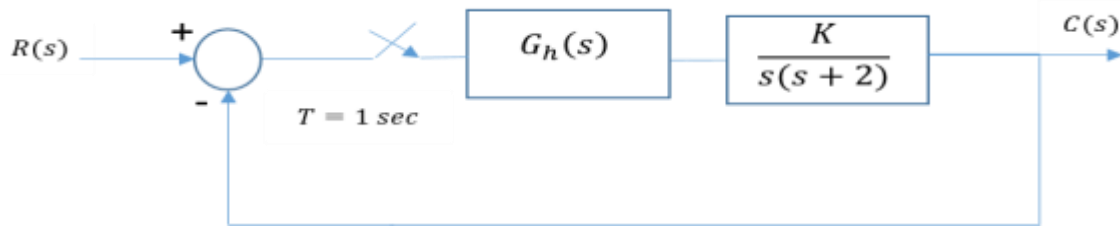
- a) bilinear transformation
- b) Jury test

3. Write the system characteristic equation, check the system stability

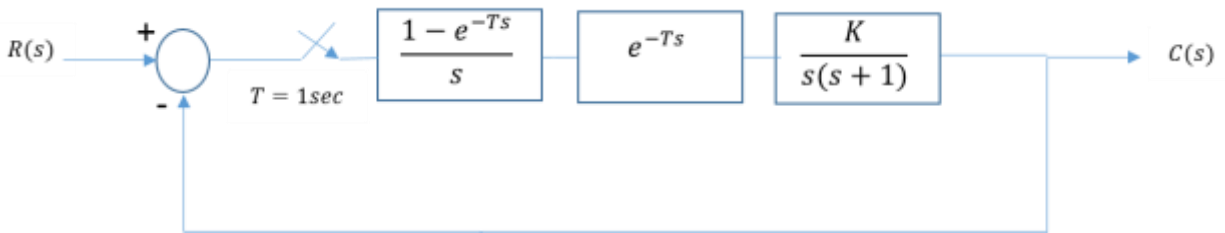


4. For the following system, determine the range of K for stability

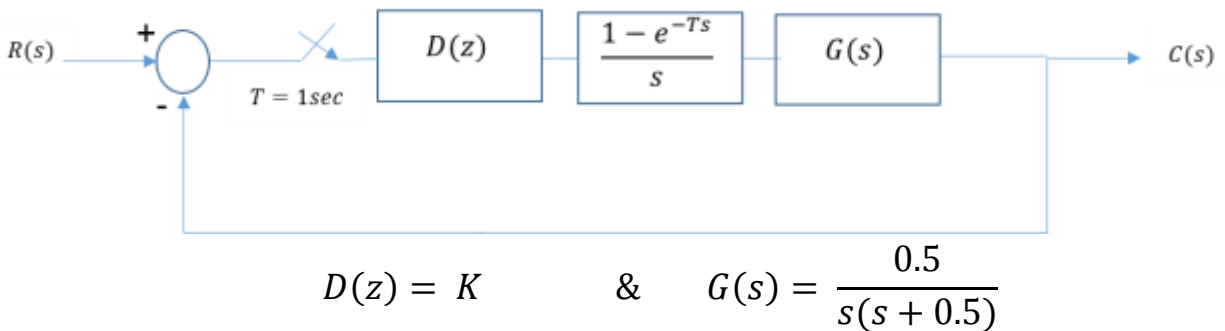
a)



b)



c)



5. For the following system characteristic equations using: bilinear transformation and Jury test.

- $F(z) = z^3 + 5z^2 + 3z + 2$
- $F(z) = z^3 - 1.3z^2 - 0.08z + 0.24$
- $F(z) = z^3 - 1.8z^2 + 1.05z - 0.2$
- $F(z) = z^4 - z^3 + 1.8z^2 + z - 0.4$